Chapter II

REVIEW OF RELATED LITERATURE

A review of literature related to the present study on the physical, physiological, psychological and socio-economic status variables of athletes participating in different sports activities has been presented in this chapter to provide the background material for the study.

Physical and Anthropometric Variables

Research workers have carried out numerous studies on the various factors which contribute to the performance in different sports and games. The limits of certain types of performance, and the manner in which physique and physical fitness factors play a part in setting these limits are of fundamental importance to the scientists. The studies which are related to the contribution of the physique and the physical fitness factors to the performance in different sports and games are cited below in abstract form.

Schmitz\(^1\) compared the general athletic ability of forty athletes, comprising four groups of 10 skilled subjects

in each group in the sports of football, basketball, baseball and track and field. They were tested using Cozen's general athletic ability test for college men to determine if successful performance in any one of the selected sports could be used to predict all round participation ability. Results showed no significant difference in general or all-round athletic ability between varsity athletes in the four groups.

Morrow et al.\(^2\) studied the anthropometric characteristics strength and performance of fortynine American Discus throwers, hammer throwers, javelin throwers and shot putters who participated in pre-olympic training camp. Comparison between event participants indicated that they differ significantly on the anthropometric and strength variables but were alike in terms of motor performance variables.

Joseph\(^3\) determined the relationship of power, agility, shoulder flexibility and arm length to volleyball playing ability and concluded that power was the most reliable


single variable in prediction of volleyball playing ability. Arm length and leg length also showed significant relationship to playing ability, whereas agility and shoulder flexibility showed insignificant relationship in prediction of playing ability.

Baker⁴ studied the factors associated with the success in volleyball. Height, weight, leg extensor strength, grip strength, skinfold, measurements, reaction time etc. were tested and found that jumping ability and reaction time were significantly related to success in volleyball.

Marrow et al.⁵ established the importance of strength speed and body size for team success in women's intercollegiate volleyball and the result showed that the stronger, faster and leaner teams were the most successful in tournament play. Upper body strength and fat weight were identified as most important in differentiating between players of the most and least successful team.


Jones\textsuperscript{6} investigated the relationship of selected physical fitness and mood variables to success in female high school basketball players being chosen to become varsity players. He found that the fitness factors such as, speed, aerobic endurance, agility, leg power and skill testing and personal factors were successful indicator of the group's membership.

Campbell\textsuperscript{7} conducted research on the relationship of selected measures of physical performance and structure to quality of performance in collegiate football players. He tested 40 male football players for height, weight, 10, 20, 30 and 40 yard dash, speed, vertical jump, agility, upper body strength and lateral movement along with a game performance assessment. No relationship was found between height, weight, agility and upper body strength to performance. Speed was found positively related to performance.

\textsuperscript{6}Mark Keven Jones, "The Relationship of Selected Physical Fitness, Skills and Mood Variance to Success in Female High School Basketball Candidates," Dissertation Abstracts International 42 (March 1982):3909-A.

He concluded that performance in football cannot be affectively predicted by combination of the structural and physical performance variables utilised in the study.

Bosworth\(^8\) studied college women (N = 107) for leg strength and vertical jumping ability. Anthropometric measurements and ratios were obtained from photographs. Co-relations were computed between the vertical jump and each of the anthropometric variables and leg strength. The cumulative effect of selected variables were not sufficiently related to the vertical jump to performance adequately.

Burkey, Dobell and Farrde\(^9\) conducted a study to determine the difference among seventh, eighth and ninth grade girls in power, speed and flexibility and certain anthropometric measures. It was concluded that seventh grade girls were faster than eighth grade in the 50 yard


dash; ninth grade girls broad jumped further than seventh and eighth grade girls. However, no significant relations were found in the other items studied.

Clarke\textsuperscript{10} conducted a study to find out the relationship of strength and anthropometric measurements to physical performance of 53 unselected, non-disabled male students at the University of Oregon, involving trunk and legs. He concluded that inter correlations among some of the anthropometric variables were especially high 0.91 standing heights with leg lengths 0.88, foot length with leg length and 0.87 body weight with hip width and thigh girth. The height strength test inter correlation was 0.65 between trunk flexion and extension.

Fleck\textsuperscript{11} conducted a study to determine body composition of elite American Athletes. Five hundred and twenty eight athletes participating in 26 Olympic events and 298

\textsuperscript{10} H. Harrison Clarke, "Relationship of Strength, and Anthropometric Measures to Physical Performance Including the Trunk and Legs," Research Quarterly 28 (October 1957):223-232.

female athletes participating in 15 Olympic events underwent determination of body fat percentage and lean body mass. All groups of athletes were below the average values of % fat of college age men and women of 15% and 25% respectively. Athletes involved in sports events had 6.5 ± 1.2 (male) and 13.7 ± 3.6 (female) that are very anaerobic in nature and extremely aerobic events such as the marathon (6.4 ± 1.3% male) demonstrated lower % fat values. Athletes involved in sports where body size is a definite advantage, such as basketball (males 84.1 ± 6.2 Kg; females 55.3 ± 4.9 kg) and volleyball (males 75.0 ± 6.6 kg; females 58.4 ± 4.5 kg) tended to have larger lean body mass (LBW).

Hoster, Morrow and Jackson¹² studied 180 collegiate women volleyball players and concluded that women collegiate volleyball players tended to be slightly taller, heavier, and had broader shoulder and narrow hips and the mean 20 yard sprint obtained was faster.

Dey et al.\textsuperscript{13} selected 12 athletes from swimming, basketball, handball and table tennis, from the first four standing teams of the National School Games and were tested for different anthropometric measurements. The result of the study shows that basketball players have higher values in height, arm length, by length, thigh girth and weight than those of the hand ball, swimming and table tennis players.

The relationship among selected anthropometric variables and relative body fat was investigated by Diez\textsuperscript{14} in college-age women. The results indicated that simple anthropometric measurements can be used to predict body density and body fat in college-age women by the regression equation developed on other samples of college-age women are somewhat less predictive of fat contents.


\textsuperscript{14} Elizabeth D. Diez, "Relation of Anthropometric Measure to Body Fatness in College Age Women," \textit{Completed Research in Health, Physical Education and Recreation} 21 (1979):234.
Hebbelinek\textsuperscript{15} studied the anthropometric measurements, somato type ratings and certain motor fitness tests of physical education Major in South Africa. The anthropometric data showed a predominant trend towards athlete type. The relationship between motor fitness and body measurements found to be low except neck girth and shot put. The mesomorphic trait was most distinctive feature of the subjects somatotype. Mesomorphs were superior in all motor fitness tests except 60 yard dash. Ecto-mesomorphs were better than endomesomorphs in all events except shot put.

Abdo\textsuperscript{16} conducted a study on leg strength, height, weight factors in relations to cardiovascular efficiency of college women. Data collected from 198 subjects inter-correlated. The results indicated that excess weight had effect on cardio-vascular efficiency while leg strength correlated positively with step test performance. The


linear correlation between cardio-vascular efficiency and ponderal index was significant. But regression line levelled for women with high cardio-vascular efficiency.

Kansal and Others\(^{17}\) studied the physique and body composition of the Intervarsity soccer players of zonal champion and runner up teams of the North Zone. They concluded that defense line players were significantly taller and heavier than forward line players, and broader femur bicyondylar diameter accompanied by better developed thighs and calves in comparison to offensive players. The forward line players had slightly less percentage of body fat and more of lean body mass compared to defence players.

Vaccaro, Clarke and Wrenn\(^{18}\) conducted a study on physiological profiles of elite women basketball players. 15 members of the University of Maryland Women Basketball Team were assessed for body composition, somatotype muscular strength, endurance pulmonary function and aerobic


capacity during the 1976-77 basketball season. Result of the analysis indicated that (1) measures of height and weight established here were greater than that of the average female and most other women athletes; (2) mean percentage of fat was less than those values reported for female athletes, but somewhat greater than those reported for women distance runners, (3) mean somatotype was similar to those reported for normal group women.

Butts\(^{19}\) tested 127 high school females cross country runners on percent body fat, ratings of perceived exertion and maximal oxygen consumption during a continuous running treadmill test. The high school female runners had higher VO\(_2\) max than previously reported for this age group, however, they were considerably below these values reported for national calibre distance runners.

Bevans\textsuperscript{20} studied female gymnasts (N=35) and distance runners (N=53) from a college population. Twelve measurements were taken to determine somatotype by the use of the Heath-Carter anthropometric method. Analysis of data showed that the gymnasts were significantly greater than distance runners in body weight and the skinfold measurements of subscapular, supra-iliac and calf values as well as \% of body fat. The gymnasts also had larger humerus and femur diameter. Distance runners group were balanced ectomorph. Both gymnasts and distance runners tended to be low in fat content.

Cunningham and Anderson\textsuperscript{21} tested six high school cross country runners, who were members of the team which was the Messachus State high school champions. Mean anthropometric values found this team to be shorter, lighter and of less fat when compared to age related norms. The


mean somatotype was considered more ectomorphic and less mesomorphic than elite endurance athletes. It was concluded that members of a championship cross country team exhibit a physiological profile which are characteristics of endurance athletes. Team members show little inter-individual variation. No adverse effects of season long training were noted. Several well known cardio-vascular risk factors were considered low normal in this group.

Hall\textsuperscript{22} studied the anthropometric estimation of body density of women athletes in selected athletic activities. Twentytwo anthropometric measurements were evaluated to determine their relationship to body density of women varsity athletes on four intercollegiate teams. Analysis of the data indicated that women athletes must be considered as distinct population by sport.

Joseph\textsuperscript{23} determined the relationship of selected strength and anthropometric variables to performance in


\textsuperscript{23}P.T. Joseph, "Relationship of Selected Anthropometric and Strength Variables to Speed Performance," Unpublished Master's Thesis, Jiwaji University, 1984."
sprints. The analysis of data showed a significant relationship between leg power, abdominal strength, thigh girth and calf girth to speed performance. Whereas the relationship of height and leg length to speed performance was not significant.

Amusa\textsuperscript{24} selected 46 students, who were well conditioned soccer players with at least two years playing experience on the college level. They were tested for running speed, power, agility, \textit{VO}_2 max strength, anaerobic capacity and flexibility, in addition 11 anthropometric measurements consisting of skinfold and body dimensions. Soccer playing ability served as the criterion and was measured by the rating of three experienced soccer coaches based on selected soccer skills and strategies. Analysis of data indicated that age (experience) is the best single predictor to playing ability, body weight and height were also considered as good predictors of playing ability. \textit{VO}_2 max and running speed are considered important factors in soccer performance. Flexibility, agility, lactate

concentration and leg power are not considered as varied indicators of playing ability.

Sodhi et al.\(^{25}\) studied selected kinanthropometric characteristics of Indian volleyball players of National, State and District level. Each subject was examined with 12 anthropometric measurements and 10 tests of performance. The latter consisted of block jump, three successive jumps, 20 m. dash, agility, basketball throw, 30 sec. sit-ups maximum sit ups, flexibility and 2.4 km run.

The results of the study reveal the other groups of volleyball players and the controls, with a persistent decreasing gradient in most of the variables. In somatotyping the volleyballers on the whole possess less rating of endomorphic component than the controls. In all the physical performance tests except 2.4 km run the National players were the best followed by the State the University, the District players, and the controls with a descending gradient of performance. Over all the National level

players were the best among the volleyball players, and volleyballers as a whole were better than the controls in this regard.

Wilmore\textsuperscript{26} compared the body composition and anthropometric characteristics of sports men and women participating in different sports and games, and he found that basketball players and volleyball players have more height and weight than sprinters and cross country runners. The percentage of body fat was 12.4\%, 10.2\%, 10.6\% for sprinters, cross country runners and basketball players respectively in male section and 16.5\%, 17.7\%, 20.8\% and 21.3\% for sprinters, cross country runners, basketball players and volleyball players respectively in female section.

Housh et al.\textsuperscript{27} studied the body build and composition characteristics of elite participants of track and


field, swimming wrestling and gymnastics. They found that throwers were taller, heavier and had more fat and least value of ponderal index among the different groups studied. Sprinters had average height of 178.19 cms weight of 67.3 kg, ponderal index 47.93 and fat weight of 8.2 kg.

Summary of Results of Physical and Anthropometric Studies

The above mentioned studies indicate that physical fitness components such as speed, strength, agility, speed of movement etc., have a significant relationship to the performance in different sports and games. Speed and leg power are highly correlated to sprint performance. Leg power, speed, agility, speed of movement and shoulder strength are contributing to performance in volleyball and basketball. A good basic speed along with other physiological characteristics give an advantage to cross country runners.

The above reviews also indicate that anthropometric characteristics of athletes participating in different sports and games are distinct in nature. Basketball players and volleyball players are taller and heavier than that of
sprinters and cross country runners. Cross country runners have least percentage of body fat and high lean body-weight compared to volleyball players and sprinters. Therefore it can be concluded that sportsman and sportswoman excelling in different sports and games have a high degree of physical fitness along with suitable physique for the particular sports.

**Physiological Variables**

It is a well known fact that cardio-vascular fitness is an essential factor for excellent performance in any sports that requires physical stress. Evidence have also been proved that involvement in regular sports training improves the functioning capacity of the organism, and the studies listed below may give more evidence in this regard.

Singh and Gill\(^2\) conducted a study to examine the physical and physiological characteristics of volleyball players, football players and cross country runners. Under

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physiological variables, vital capacity, maximum breath holding capacity, maximum expiratory pressure, heart rates, systolic and diastolic blood pressure were taken and a dynamic cardio-pulmonary index was calculated results showed that cross country runners had higher cardio-pulmonary index than footballers and volleyballers.

Schreiber\textsuperscript{29} evaluated anaerobic capacity and somatotype on 51 varsity college athletes. Anaerobic capacity was evaluated through blood lactate determinations and administration of Margaria's test of anaerobic power. Results indicate that participation in each of the athletic specialties investigated; football, basketball, soccer, gymnastics, wrestling, cross country running a relatively homogenous somatotype, particular to their sport. Anaerobic capacity was enhanced as a result of eight weeks conditioning those sports which constitute work periods of high intensity but of short duration made most significant increase in both the lactic and alactacid components of anaerobic capacity.

Coleman et al.\textsuperscript{30} studied nine college basketball athletes to determine the effects of a season of competition on the aerobic and anaerobic energy sources pre and past season variables of testing and recovery heart rates, performance of the treadmill test (time), maximal O\textsubscript{2} intake (ml/kg min) and the scores of Margaria's anaerobic capacity test (vertical velocity) were studied. Analysis of data yielded non-significant decrease in recovery heart rate and anaerobic power and significant increase in vertical velocity from pre to post test. The result of this investigation suggest that the training regime in basketball was of sufficient intensity to maintain cardio-respiratory function and improve anaerobic performance.

Sperling\textsuperscript{31} conducted this study to organise and integrate information related to the biological determinants of distance running performance into a model that


accounts for the functional relationships among variables. The variables used in the multiple regression/Correlation analysis were cardio-respiratory capacity (VO₂ max) % body fat, anaerobic threshold ( % VO₂ max) and running efficiency. Results of this study indicate that among a group of trained adult runners distance running can be predicted with a relatively high degree of accuracy from laboratory measures of cardio-respiratory capacity % body fat and running efficiency.

Kim Tac-Un\textsuperscript{32} conducted a study to identify which physiological, and psychological variables discriminate good (G.D.R.) from moderate (M.D.R.) distance runners and to examine the relationship between their variables and 10 km. performance, max O₂ consumption, anaerobic threshold and percentage body fat, multiple regression analysis also indicated that VO₂ max accounted for most of the variable on 10 km. performance for composite ($R^2 = .80$ P .01), for G.D.R. ($R^2 = .41$, P .01) and for M.R.D. group ($R^2 = .64$, P .01) other variables had little effect on increasing $R^2$ for composite group ($R = .82$, P .05) and no effect for G.D.R. or M.R.D. group.

\textsuperscript{32}Kim Tac-Un, "An Analysis of Physiological and Psychological Difference between Good and Moderate Performance Distance Runners," Dissertation Abstract International 48:7 (June 1988):1700-A.
Farrell and Coyle\textsuperscript{33} investigated on 18 experienced male distance runners, physical characteristic and responses to maximal exercise on an average of eight treadmill runs at various speeds were taken. The relationship between heart rate and treadmill velocity was linear ($r = .95$). The correlation between performance and most of these variables are not in excess of the correlation found in this study. Thus as a predictive tool, heart rates at a standardised treadmill velocity may be preferable due to the ease at data collection.

Puhl and Runyen\textsuperscript{34} conducted a study to observe the effect of a progressive aerobic training programme on haemoglobin concentration (Hb), haematocrit (Hct), RBC, mean RBC size (McV) and mean capuscular haemoglobin (MCH) of college women ($N=19$). Training consisted of jogging (3 X week) one mile per session (week 1) with a progressive increase in duration to 5 miles per session (week 9).

\textsuperscript{33}Peter A. Farrell and Edward F. Goyle, "Exercise Heart Rate as a Predictor of Running Performance," Research Quarterly for Exercise and Sport 51 (October 1980):417-421.

significant decreasing quadratic trends. For Hb, Hct, and RBC count, a significant trend for MCV and no change in MCH during training. Despite the initial trend, values that changed did return to near-pertaining levels by the end of the nine week programme these chances are only transitory.

Wither\textsuperscript{35} compared aerobic power, anaerobic power and body composition of South Australian male representatives in track and field, basketball, field hockey and soccer. The runners and walkers exhibited the highest mean VO\textsubscript{2} max and the no virtual difference between hockey and basketball players. The team game players scored much higher than runners and walkers on absolute power. The average percentage of body fat for runners and walkers, basketball players, hockey players and soccer players were 13.1, 16.6, 16.7 and 15.7 respectively.

Paris et al\textsuperscript{36} conducted a study on physiological profiles of world class decathlon athletes. The subjects


demonstrated high aerobic capacity (X 57.57). The average maximum heart rate was 184 p.m.

Tharp, Johnson and Jhorland measured the anaerobic capacity in elite young track athletes using wingate test and he compared the anaerobic capacity of male and female sprinters and long distance runners. The result indicated that the males had a significantly higher anaerobic capacity level than females. Sprinters in both the groups had better anaerobic capacity than long distance runners.

Renfrow concluded that aerobic training programme has little or no effect on cardio-vascular endurance in elementary school children. However, he said that the aerobic programme does have a significant effect on percentage of body fat.

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Summary of Results of Physiological Studies

The above reviews shows that involvement in regular sports training brings about desirable changes in the physical and physiological variables, which in turn contribute the development of speed, strength, endurance, agility etc. along with better functioning ability of cardio-respiratory system. It was noted from the above studies that sprinters and volleyball players have a high degree of anaerobic capacity, whereas cross country runners and basketball players have a better aerobic capacity. Distance runners have less heart rate and more blood haemoglobin content, compared to other groups. The studies conclude that athletes participating in different sports and games possess particular physiological characteristics according to the demand of the sports.

Psychological Variables

It is believed that sportsmen and sportswomen who participate in different sports and games possess unique and definite personality characteristics. That there are in fact certain personality characteristics which distinguish the athlete from non athletes or the outstanding
athlete from the average athletes. Studies show that athlete with ability, desire and the motivation only could show high level performance in any sport, some of the studies which are related to the selected personality characteristics (Extraversion-Neuroticism) and achievement motivation is given below.

Whitting and Stennbridge\textsuperscript{39} divided won swimmers into two categories. Analysis of the scores on Mandsley personality inventories given to university male won swimmers indicated that students in category 1 had a lower extraversion mean than those in category 2, but results were only significant at the 10 percent level.

Shaw, Singh and Pathak\textsuperscript{40} administered personality questionnaire and competitive state anxiety inventory-2 on twenty one international marathon runners to investigate extraversion, neuroticism, psychotism and state anxiety, cognitive anxiety, self confidence. The results obtained indicated that successful marathon runners found to have


mean value in age (chronological) extraversion, neuroticism and self confidence scale. Whereas low mean value in psychotism, cognitive anxiety, somatic anxiety and total competitive state anxiety.

Meiers\textsuperscript{41} administered the Cattell 16 PF Questionnaire to 110 varsity athletes participating in seven different sports. Results of this study indicated that reserve athletes were more outgoing and warmhearted than first string athletes. Specific differences were reported for athletes in swimming, volleyball, water polo, wrestling and track.

Kane\textsuperscript{42} conducted studies on the personality profiles and physical ability of physical education students and concluded that male athletes are more extrovert than female athletes.


Sperting\textsuperscript{43} reported that personality difference on a group basis exist among participants in various sports. He found no significant personality difference between varsity and intramural group. However there was reliable difference in personality pattern of varsity and intramural group as distinguished from those of the non athletic groups.

Singh and Brar\textsuperscript{44} conducted a study of extraversion-neuroticism and self concept on university Handball players and compared the extraversion, neuroticism and self concept of male and female players. The finding of the study indicated that there is no significant difference in extraversion and neuroticism between male and female and they are just above the norm in neuroticism and just below in case of extraversion.

\textsuperscript{43} A.P. Sperting, "The Relationship between Personality Achievement in Physical Education Activities," \textit{Research Quarterly} 13 (December 1942): 361-363.

Lackie\textsuperscript{45} administered attitude inventory to 230 athletes from a state university, a private university and two state colleges. Scores on personality scales differentiated among sports groups within the state university and private university, but not within the state colleges and between athletes attending the private university and those attending each of other three schools. When the two hundred and thirty athletes were grouped by sports, irrespective of the school attended no significant differences were observed.

Sindhu, Mann and Brar\textsuperscript{46} compared extraversion-neuroticism and attention between team and individual athletes and they concluded that team players and wrestlers were equally extraverted (below the norms). However wrestlers were found to be higher in the scale of neuroticism.


\textsuperscript{46}G.S. Sindhu; N.S. Mann and R.S. Brar, "Comparative Study of Extraversion-Neuroticism and Attention of Team and Individual Athletes," Cited by Sodhi et al., Sports Sciences Health Fitness and Performance, pp. 233-236.
Mehta\textsuperscript{47} made an analysis of personality traits of medium, spin and fast bowlers, wicket keepers and batsmen of National level and concluded that in the dimensions of neuroticism significant difference was found between wicket keepers and spin bowlers and in extraversion, difference was found between wicket keepers and batsmen, wicket keepers and fast bowlers.

Singh\textsuperscript{48} tested the psychological characteristics of top level male and female track and field athletes and hockey players. The result of the study showed that on extraversion and neuroticism, the mean difference scored between the athletes and hockey players were significant. The athletes have obtained more scores on extraversion as well as on neuroticism than the hockey players, whether they are males or females.


Hayberg et al.\textsuperscript{49} determined the psychological characteristics of National Class American Cyclists using Eysenck personality inventory. The result indicated that the cyclists were more introverted than normal adults. This is in contradict to what has been found for elite marathon runners, but agrees with trait of introversion found in marathon runners of other competitive level.

Malumphy\textsuperscript{50} tested four groups of participants, those engaged in individual sports, team sports, team individual and non-participants. She investigated four general variables of personality in intercollegiate competitions and found a significant difference in personality and other variables tested.


\textsuperscript{50} Theresa M. Malumphy, "Personality and General Characteristics of Women Athletes in Inter-collegiate Competitions," \textit{Completed Research in Health, Physical Education and Recreation} 10 (1968):74.
Tucker\textsuperscript{51} conducted a study to determine the relationship between the relative muscular strength and the personality in college males. The result showed that relative muscular strength to be a significant predication of body cathescis, extraversion, neuroticism and globel self concept. In general relatively strong males were more out going and sociable their muscularity weaker counter parts.

Maxon\textsuperscript{52} conducted a study on achieving tendency in university swimmers and found there was a significant positive ‘r’ between score obtained by the male and female swimmers. Female swimmers had a higher achievement motivation compared to male in general college students obtained higher scores than the norms of the Meharabian measure of achieving tendency.


Nesvig\textsuperscript{53} administered a study to determine whether a relationship exists between an athletes level of achievement motivation and gymnastics meet performance, and he concluded that no significant relationship exist between the level of achievement motivation and gymnastics meet performance among men and women inter-collegiate gymnasts. He found that a significant difference existed between male and female groups in achievement motivation.

Harvey\textsuperscript{54} showed that achievement is an important component in the psychological make up of the group of athletes under study. Individual, team sports athletes and non athletes were tested to determine their need for achievement (n-achievement) as measured by Mc'Celland's Thematic Appreception test. Data resulting from Mc'Celland's 4-Picture test and a modified 6-Picture test included.2 athletes teams indicated no significant


difference among the n-achievement response scores of the 3 groups.

Ali\textsuperscript{55} studied the Americans and Jordanians regarding the reason for participation and dropping out, and factors of achievement motives that might discriminate between Americans and Jordanians. There were no significant difference found between Americans and Jordanians in their factors of achievement motivation for sports participation.

Montgomery\textsuperscript{56} administered athletic motivation inventory and Cattell's 16 PF Questionnaire to the top 13 inter-collegiate basketball players to determine if there are personality trait differences between men and women basketball players at the college level. The result showed that for the trait of drive, aggression, determination and self confidence on the AM 1, significant differences were found between men and women.


basketball players at the 0.05 level.

Brown\textsuperscript{57} conducted a study to find out the inter-
relationship of Androgyny, self esteem and achievement
motivation of female athletes. Subjects were 75 female
athletes from 8 varsity teams at LSU and 72 non-athletes
selected from english classes on the basis of scores on
two personality inventories, the Mehrabian test for ach-
ieving tendency for females and the short form of the PRF
Andro Scale the IDI. Subjects were categorised into 4
sex role and 3 achievement groups. The self esteem scores
was also recorded for each subject. Regression ANOVA and
Chi-square were used in the analysis of data. Female
athletes were more androgynous than the non-athletes.
The non-athletes consisted largely of feminine sex typed
individuals. Subjects scored significantly, lower on self
esteem. There were no significant correlation between
self esteem and achievement motivation.

\textsuperscript{57}Beberly S. Brown, "The Inter-relationship of
Androgyny, Self-esteem and Achievement Motivation of
Female Athletes," Completed Research in Health, Physical
Summary of Results of Psychological Studies

Reviews indicate that personality characteristics of sportsmen and sportswomen participating in different sports and games are distinct in nature. Excellent athletes of different sports disciplines are proved more extroverted and less neurotic. Participants of some individual sports events are comparatively less extrovert than team players. The studies also indicate that sportsmen are more extrovert and less neurotic compared to sportswomen. The above mentioned studies also indicate that achievement motivation is an important component of psychological make up of the athlete. Athletes participating at different levels of competition have different level of achievement motivation, and also the level of achievement motivation differs between sportsmen and sportswomen participating in different sports disciplines.

Socio-Economic Status

Research studies have revealed that the selection of a sports activity by an individual is to some extent influenced by the social and economic status of
the individual and the society. However it is noted that people from all levels of the society involved in sports activities. Research workers have carried out numerous studies in this regard and some of the studies which are relevant to the present study are cited here.

Webb\textsuperscript{58} reported that the athletes in general and amateur athletes in particular does not come from low socio-economic status facilities. When he compared all athlete's families he found that only a few of the athletes in his sample of Michigan State Scholarship athletes come from families occupying the bottom fifth of the income range.

Nehra\textsuperscript{59} made a study on the socio-economic status of team mates in different sports and concluded


that members of basketball, hockey, athletics, cricket and football teams differ in their socio-economic status; cricket players belonged to the highest socio-economic status group and the athletes belonged to the lowest socio-economic status group.

Cole\textsuperscript{60} had found that an individual's socio-economic status does not lead to the prediction of his attitude towards physical education activities and his gross motor performance ability. Combined information of the individual's attitude towards physical education activities and socio-economic status does not lead to prediction of his motor performance.

Sharma\textsuperscript{61} in his study on athletes representing K.V.S. in National School Games concluded that table


tennis, badminton and cricket are dominated by higher socio-economic status groups, volleyball by upper middle strata, basketball, football, kho-kho and track and field by lower middle strata and gymnastics by lower strata.

Slooten and Harold\textsuperscript{62} conducted a study on the performance of selected motor co-ordination tasks by young boys and girls of the six socio-economic status groups and reached the conclusion that the task performance of children from the lower socio-economic status level were superior to performance of children from the average and higher socio-economic status level.

Jasper\textsuperscript{63} found no significant difference among the different socio-economic status groups in physical


fitness and Young\textsuperscript{64} used AAHPER physical fitness test and found no significant difference between socio-economic groups with reference to physical fitness.

Riddle\textsuperscript{65} in his study concluded that the socio-economic status for the University sample students was not a significant factor in physical activity performance.

Stone\textsuperscript{66} asked a sample of Minneaplic adults about their sports performance and aligned these performance with status position in approximately the following manner, Upper Status-Golf, Tennis, Football, Baseball and

\begin{itemize}
  \item[65] Lynne Riddle, "Relationship between Physical Education Activity Performance, Socio-economic Status and Personality Need of Freshmen and Sophomore College," Dissertation Abstracts International 30 (September 1969): 1005.
\end{itemize}
Hockey, Middle Strata-Basketball, Bowling and Lower Strata Boxing and Wrestling.

Yadav\(^{67}\) in his study concluded that there is no significant difference between university athletes and non-athletes in socio-economic status level. He further concluded that sport like tennis, badminton, swimming etc. are attracted by players from higher socio-economic status and sports like football, volleyball, boxing etc. are popular among middle socio-economic status groups and wrestling, hockey etc. with lower middle socio-economic status group.

Williams\(^{68}\) studied the relationship of race and socio-economic status to motor ability and athletic skill in elementary school children and found that difference


existing between black and whites, and between their socio-economic status groups on motor performance. Blacks were found to be significantly superior to whites when compared on motor ability scores. In addition blacks at each level of socio-economic status consistently demonstrated higher motor ability scores than whites at comparable levels, when socio-economic status levels were compared on motor performance without regard to race non-significant differences were found.

Ross⁶⁹ in his study of thirteen selected social factors came to the conclusion that student's family income and the education of their fathers were two strong influencing factors on the rate of participation of the students in recreational activities.

Ponthieux and Barker⁷⁰ reported significant correlations between socio-economic status and performance


on the AAHPER Test in a mixed racial sample of fifth and sixth grade children. The significant relationships, however, did not consistently favour either the high or low socio-economic groups.

**Summary of Results of Socio-Economic Status Studies**

The above studies reveals that sports participation have a little relation to the socio-economic status of the individual. People from all socio-economic status groups participate in sports and games, socio-economic status is not highly related to physical fitness. However it was noticed from the above studies that socio-economic status level of athletes participating in different sports and games varies to a great extent. Some particular sports more participants are from upper socio-economic strata group and in some other events majority of participants are from lower socio-economic status group in Indian condition volleyball players and basketball players come from middle socio-economic status group and track and field athletes come from lower middle socio-economic status group.